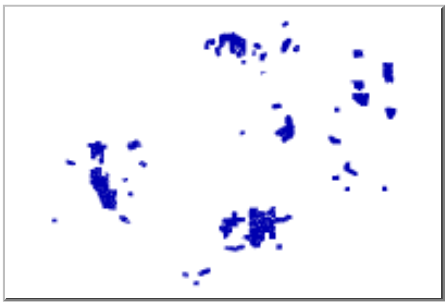
# Total Terrestrial Gamma Activity Contours for an Aerial Radiological Survey of Abandoned Uranium Mines in the Navajo Nation



**Data format:** Shapefile

**File or table name:** Gross_Counts

**Coordinate system:** Geographic

**Theme keywords:** Ground Surface Exposure Rate, Aerial Gross Counts, Total Terrestrial Gamma Activity, Aerial Radiological Surveys, Gamma Radiation

**Abstract:** This line shapefile provides iso-contours for ground surface exposure rate from total terrestrial gamma activity, and calculated from aerial gross count data (all gamma events in the range of 38-3026 keV). Forty one (41) aerial radiological surveys of potential uranium mining areas (1,144 square miles) were conducted within the Navajo Nation during the period from October 1994 through October 1999. The US Environmental Protection Agency (USEPA) Region 9 funded the surveys and the US Department of Energy (USDOE) Remote Sensing Laboratory (RSL) in Las Vegas, Nevada conducted the aerial surveys. The aerial survey data were used to characterize the overall radioactivity (ground surface exposure rate) and excess Bismuth 214 levels within the surveyed areas.

## FGDC and ESRI Metadata:



Metadata elements shown with blue text are defined in the Federal Geographic Data Committee's (FGDC) *Content Standard for Digital Geospatial Metadata (CSDGM)*. Elements shown with green text are defined in the *ESRI Profile of the CSDGM*. Elements shown with a green asterisk (*) will be automatically updated by ArcCatalog. ArcCatalog adds hints indicating which FGDC elements are mandatory; these are shown with gray text.

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## Identification Information:

**Citation:**

**Citation information:**

**Originators:** Thane Hendricks, Bechtel Nevada, USDOE Remote Sensing Laboratory

**Title:**

Total Terrestrial Gamma Activity Contours for an Aerial Radiological Survey of Abandoned Uranium Mines in the Navajo Nation

***File or table name:** Gross_Counts

**Publication date:** August 2001
**Publication time:** Unknown
***Geospatial data presentation form:** vector digital data

**Publication information:**
**Publication place:** Las Vegas, NV
**Publisher:** U.S. Department of Energy

**Other citation details:**
For a detailed description of this survey of the Navajo Nation, see the DOE report: "DOE/NV11718--602" Skey for this document is S03310309.

***Online linkage:** \\Terra_dc\Navajo\NAUM_DB\Aerial_Rad\Gross_Counts.shp

**Description:**

**Abstract:**
This line shapefile provides iso-contours for ground surface exposure rate from total terrestrial gamma activity, and calculated from aerial gross count data (all gamma events in the range of 38-3026 keV). Forty one (41) aerial radiological surveys of potential uranium mining areas (1,144 square miles) were conducted within the Navajo Nation during the period from October 1994 through October 1999. The US Environmental Protection Agency (USEPA) Region 9 funded the surveys and the US Department of Energy (USDOE) Remote Sensing Laboratory (RSL) in Las Vegas, Nevada conducted the aerial surveys. The aerial survey data were used to characterize the overall radioactivity (ground surface exposure rate) and excess Bismuth 214 levels within the surveyed areas.

**Purpose:**
This dataset was developed to support the U.S. Environmental Protection Agency (USEPA) in its undertaking of an extensive scientific study to determine if abandoned uranium mines (AUM) and related mine features pose a significant risk to human health and the environment, and to identify areas requiring action to reduce risk for the Navajo Nation.

***Language of dataset:** en

**Time period of content:**
**Time period information:**
**Range of dates/times:**
**Beginning date:** October, 1994
**Beginning time:** unknown
**Ending date:** October, 1999
**Ending time:** unknown

**Currentness reference:**
ground condition

**Status:**
**Progress:** Complete
**Maintenance and update frequency:** None planned

**Spatial domain:**
**Bounding coordinates:**
***West bounding coordinate:** -111.780750
***East bounding coordinate:** -108.972101

*North bounding coordinate: 37.159288
*South bounding coordinate: 35.007758

Local bounding coordinates:
*Left bounding coordinate: -111.780750
*Right bounding coordinate: -108.972101
*Top bounding coordinate: 37.159288
*Bottom bounding coordinate: 35.007758

Keywords:
Theme:
Theme keywords: Ground Surface Exposure Rate, Aerial Gross Counts, Total Terrestrial Gamma Activity, Aerial Radiological Surveys, Gamma Radiation
Theme keyword thesaurus: None

Place:
Place keywords: Navajo Nation, Arizona, New Mexico, Utah, United States
Place keyword thesaurus: None

Access constraints: None
Use constraints:
Ground surface exposure rate measures total gamma radiation activity without considering constituent isotopic sources. 1144 square miles of the more than 25,000 square mile Navajo Nation were surveyed. This area does not include all areas that may have had uranium mining. Specifically, these surveys do not include the Grants Uranium District that is partially on the Eastern Agency of the Navajo Nation.

Use of this data generally requires computer workstations with ESRI's Arc/Info (8.x or above), ArcGIS (8.x or above), or ArcView (3.x), or some other GIS or CAD software that is capable of reading or converting this dataset.

The data are provided "as-is," without warranty of any kind, either express or implied.

These data have been compiled as part of a desktop project to collect existing spatial data to support the study of Navajo abandoned uranium mines. No field verifications were undertaken as part of this desktop study.

Point of contact:
Contact information:
Contact organization primary:
Contact organization: U. S. Environmental Protection Agency, Region 9, Superfund Program

Contact address:
Address type: mailing and physical address
Address:
75 Hawthorne St (SFD 8-2)
City: San Francisco
State or province: CA
Postal code: 94105
Country: USA

Contact voice telephone: 415-972-3167

Security information:
Security classification system: None

*__Native dataset format:__ Shapefile
*__Native data set environment:__
Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.1.0.780

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## Data Quality Information:

**Attribute accuracy:**
**Attribute accuracy report:**
Attribute data are from the source data.

**Logical consistency report:**
This line shapefile has been visually inspected for extent and number of lines and accuracy of attribute data. In the overlap area of the Red Valley and Red Valley South flight areas, within the Four Corners region, contours of equal exposure rate overlapped. Single contours of a given exposure rate were selected that provided the best spatial continuity. In one case, two overlapping lines of equal exposure rate did not readily provide for a single line with the best spatial continuity. These two lines were joined where they came closest to each other, discarding remaining line fragments.

**Completeness report:**
Ground surface exposure rate measures total gamma radiation activity without considering constituent isotopic sources. 1144 square miles of the more than 25,000 square mile Navajo Nation were surveyed. This area does not include all areas that may have had uranium mining. Specifically, these surveys do not include the Grants Uranium District that is partially on the Eastern Agency of the Navajo Nation.

**Positional accuracy:**
**Horizontal positional accuracy:**
**Horizontal positional accuracy report:**
Aircraft position was established using a Real-time Differential Global Positioning Sustem (RDGPS) and a radar altimeter. The transmitted correction received by the helicopter's GPS unit minimized the relative positional uncertainty to +/- 15 feet (5 meters).

**Lineage:**
**Process step:**
**Process description:**
This line shapefile was derived from a series of line shapefiles of gross counts by region for the Navajo Nation. These shapefiles were merged into one shapefile and projected to Geographic Coordinates, NAD83. In the overlap area of the Red Valley and Red Valley South flight areas, within the Four Corners region, contours of equal exposure rate overlapped.single contours of a given exposure rate were selected that provided the best spatial continuity. In one case, two overlapping lines of equal exposure rate did not readily provide for a single line with the best spatial continuity. These two lines were joined where they came closest to each other, discarding remaining line fragments. The attribute CODE was not maintained from the series of shapefiles.

**Process software and version:** ESRI ArcGIS 8.3
**Process date:** June 2005

**Process contact:**
**Contact information:**
**Contact organization primary:**
**Contact organization:** TerraSpectra Geomatics

**Contact address:**
**Address type:** mailing and physical address
**Address:**
2700 E Sunset Rd, Ste A-10
**City:** Las Vegas
**State or province:** NV
**Postal code:** 89120
**Country:** USA

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## Spatial Data Organization Information:

*__Direct spatial reference method:__ Vector

**Point and vector object information:**
**SDTS terms description:**
*__Name:__ Gross_Counts
*__SDTS point and vector object type:__ String
*__Point and vector object count:__ 15448

**ESRI terms description:**
*__Name:__ Gross_Counts
*__ESRI feature type:__ Simple
*__ESRI feature geometry:__ Polyline
*__ESRI topology:__ FALSE
*__ESRI feature count:__ 15448
*__Spatial index:__ FALSE
*__Linear referencing:__ FALSE

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## Spatial Reference Information:

**Horizontal coordinate system definition:**
**Coordinate system name:**
*__Geographic coordinate system name:__ GCS_North_American_1983

**Geographic:**
*__Latitude resolution:__ 0.000000
*__Longitude resolution:__ 0.000000
*__Geographic coordinate units:__ Decimal degrees

**Geodetic model:**
*__Horizontal datum name:__ North American Datum of 1983
*__Ellipsoid name:__ Geodetic Reference System 80
*__Semi-major axis:__ 6378137.000000
*__Denominator of flattening ratio:__ 298.257222

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## Entity and Attribute Information:

**Detailed description:**

*__Name:__ Gross_Counts

**Entity type:**

*__Entity type label:__ Gross_Counts

*__Entity type type:__ Feature Class

*__Entity type count:__ 15448

**Entity type definition:**

Ground Surface Exposure Rate for an Aerial Radiological Survey of Abandoned Uranium Mines in the Navajo Nation

**Attribute:**

*__Attribute label:__ FID

*__Attribute alias:__ FID

*__Attribute definition:__

Internal feature number.

*__Attribute definition source:__

ESRI

*__Attribute type:__ OID

*__Attribute width:__ 4

*__Attribute precision:__ 0

*__Attribute scale:__ 0

**Attribute domain values:**

*__Unrepresentable domain:__

Sequential unique whole numbers that are automatically generated.

**Attribute:**

*__Attribute label:__ Shape

*__Attribute alias:__ Shape

*__Attribute definition:__

Feature geometry.

*__Attribute definition source:__

ESRI

*__Attribute type:__ Geometry

*__Attribute width:__ 0

*__Attribute precision:__ 0

*__Attribute scale:__ 0

**Attribute domain values:**

*__Unrepresentable domain:__

Coordinates defining the features.

**Attribute:**

*__Attribute label:__ EXPORATE

*__Attribute alias:__ EXPORATE

**Attribute definition:**

Ground Surface Exposure Rate in micro-R/hr

*__Attribute type:__ Number
*__Attribute width:__ 5

__Attribute:__
*__Attribute label:__ Name
*__Attribute alias:__ Name
__Attribute definition:__
name of the flight area

*__Attribute type:__ String
*__Attribute width:__ 30

__Attribute:__
*__Attribute label:__ Region
*__Attribute alias:__ Region
__Attribute definition:__
name of the region to which the flight area belongs

*__Attribute type:__ String
*__Attribute width:__ 30

__Overview description:__

__Dataset overview:__

There are 15448 Ground Surface Exposure Rate contour lines representing the observed aerial gross counts per second for an aerial radiological survey of abandoned uranium mines in the Navajo Nation.

__Entity and attribute overview:__

There is one thematic attribute:

EXPORATE is the estimated exposure rate at 1 meter above ground level in micro-R per hour, excluding cosmic ray contributions. Exposure rate is calculated from the observed counts per second at the 150 foot aircraft altitude. The conversion of count rate to exposure rate is dependant upon location dependant factors, including: radon backgroud, meteorological conditions, radon contributions, cosmic activity, aircraft backgrounds, and location independant factors: aircraft, detector size and configuration, and properties of the acquisition system.

Name - this field provides the name of the flight area

Region - this field provides the name of the region to which the flight area belongs.

For additional information contact:

Remote Sensing Laboratory
Operated by Bechtel Nevada
for the US Department of Energy.

Mailing Address:
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
P.O. Box 98518

Las Vegas, NV 89193-8518

Street Address:
232 Energy Way
North Las Vegas, NV 89030

Phone:
702-295-3521

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## Distribution Information:

**Distributor:**
**Contact information:**
**Contact organization primary:**
**Contact organization:** U. S. Environmental Protection Agency, Region 9, Superfund Records Center

**Contact address:**
**Address type:** mailing address
**Address:**
95 Hawthorne St (SFD-7C)
**City:** San Francisco
**State or province:** CA
**Postal code:** 94105
**Country:** USA

**Contact voice telephone:** 415-536-2033

**Resource description:** Downloadable Data

**Distribution liability:**
Although these data have been processed successfully on a computer system for the USEPA, no warranty expressed or implied is made by the USEPA or its contractors regarding the utility of the data on any other system, nor shall the act of distribution constitute any such warranty. No responsibility is assumed by USEPA or its contractors in the use of these data.

**Standard order process:**
**Digital form:**
**Digital transfer information:**
***Transfer size:** 9.795
***Dataset size:** 9.795

**Custom order process:**
Contact the USEPA for a custom order.
**Technical prerequisites:**
Use of this data generally requires computer workstations with ESRI's Arc/Info (8.x or above), ArcGIS (8.x or above), or ArcView (3.x), or some other GIS or CAD software that is capable of reading or converting this dataset.

**Available time period:**
**Time period information:**
**Single date/time:**

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## Metadata Reference Information:

*__Metadata date:__ 20070731

*__Language of metadata:__ en

__Metadata contact:__
__Contact information:__
__Contact person primary:__
__Contact person:__ Andrew Bain
__Contact organization:__ U. S. Environmental Protection Agency, Region 9, Superfund Program
__Contact position:__ Project Manager

__Contact address:__
__Address type:__ mailing and physical address
__Address:__
75 Hawthorne St (SFD 8-2)
__City:__ San Francisco
__State or province:__ CA
__Postal code:__ 94105
__Country:__ USA

__Contact voice telephone:__ 415-972-3167

*__Metadata standard name:__ FGDC Content Standards for Digital Geospatial Metadata
*__Metadata standard version:__ FGDC-STD-001-1998
*__Metadata time convention:__ local time

__Metadata access constraints:__ None.
__Metadata use constraints:__
None.

__Metadata security information:__
__Metadata security classification system:__ None

__Metadata extensions:__
*__Online linkage:__ http://www.esri.com/metadata/esriprof80.html
*__Profile name:__ ESRI Metadata Profile

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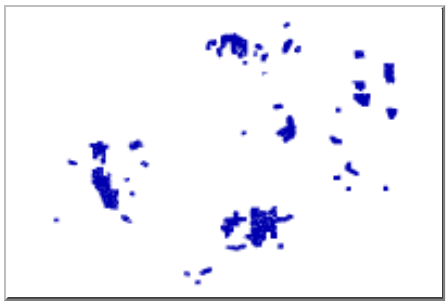
## Binary Enclosures:

__Thumbnail:__
__Enclosure type:__ Picture



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